

OPERATING SUMMARY

NEPEAN

***water pollution
control plant***

1967

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Nepean Local Advisory Committee,
Township of Nepean.

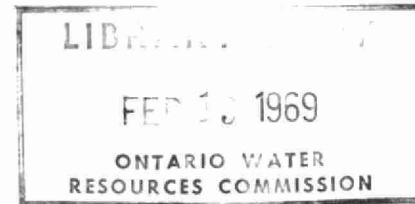
Gentlemen:

We are happy to present you with the 1967 Operating Summary for the
Nepean Water Pollution Control Plant, OWRC Project No. 2-0034-59.

Your co-operation with our staff throughout the year has been appreciated.
Only with such co-operation can the war against water pollution be waged
effectively.

Yours very truly,

D. S. Caverly
D. S. Caverly,
General Manager.





ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

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VICE-CHAIRMAN

TELEPHONE 365-

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to submit to you the 1967 Operating Summary for the Nepean Water Pollution Control Plant, OWRC Project No. 2-0034-59.

The summary reviews progress during the year, outlines operating problems encountered and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

A handwritten signature in cursive script that reads "McTavish".

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.

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NEPEAN
water pollution control plant

operated for
THE TOWNSHIP OF NEPEAN
by
THE ONTARIO WATER RESOURCES COMMISSION

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Assistant Director: C. W. Perry
Regional Supervisor: P. J. Osmond
Operations Engineer: J. N. Dick

801 Bay Street Toronto 5

'67 REVIEW

The average daily flow to the Township of Nepean Water Pollution Control plant was 2.81 mg, representing only a small increase from the 1966 average of 2.76 mg. The pumps in the Shirley's Bay pumping station have operated at maximum capacity during 1966 and 1967, reflecting the rather insignificant change in the average daily flows. The average daily flow of 2.8 mg is considerably higher than the design flow of 1.5 mg.

The operating cost for the treatment plant and the two associated pumping stations was \$45,317.05, an increase of approximately \$12,000 over the 1966 operating cost. The operating cost increased in 1967 for the following reasons:

1. Increased fuel consumption due to mechanical problems in the digester.
2. Sludge haulage costs due to mechanical problems in the digester.
3. Increased repairs and maintenance costs.
4. Taxes paid to the township which had not been paid previously.

The average BOD and suspended solids concentrations in the plant influent were 50 ppm and 105 ppm respectively. The plant effluent BOD and suspended solids concentrations were 28 ppm and 43 ppm respectively. The percent reduction of BOD was 51 and the percent reduction of suspended solids was 58. Both the concentration of the influent and effluent and the percent reduction of the BOD and suspended solids were very close to those obtained in 1966. Even when the pumps in the Shirley's Bay pumping station were operating at their maximum capacity, considerable by-passing was still experienced at this pumping station.

In the spring of 1967, the gas withdrawal pipe in the digester broke and

fell into the digester. This necessitated the withdrawal of considerable sludge until repairs could be completed. Because of the hazardous condition in the digester, considerable time was required to install a new gas withdrawal pipe. During the time of the repair to the gas line, raw sludge had to be disposed of by tank truck. This increased the operating costs considerably. Since digester gas was not produced during this time, increased fuel costs were also incurred.

In 1967, a small Cub tractor and three pull mowers were purchased to aid in the maintaining of the grounds around the plant. With the acquisition of this equipment, the time required to cut the grass on the plant grounds was considerably reduced.

Repairs were also made to the Ames Crosta Mills mechanical aerators. A new drive ring was placed on one aeration unit and considerable repairs were made to the aeration cone.

The Baily flow meter was checked out by the manufacturer to ensure correct flow readings from the plant.

Repairs were made to both the No. 1 and No. 2 pumps in the Woodroffe Avenue pumping station. Shafts, shaft sleeves and bearings were replaced in the pumps. The No. 3 pump in the Woodroffe Avenue pumping station and the two pumps in the Shirley's Bay pumping station were not overhauled in 1967.

Plant operating problems were experienced due to high flows throughout 1967. In the spring considerable difficulty was experienced due to Bunker C oil gaining access to the Shirley's Bay pumping station and plant. This oil had a tendency to cling to the concrete and various pieces of equipment and necessitated many hours of cleaning by plant personnel. Fuel oil was also received in the plant on two occasions; however, the source of this could not be found.

Inspections conducted by head office engineers and technicians in 1967 revealed the plant maintenance, cleanliness and operation to be satisfactory considering the overloading of the plant.

PROJECT COSTS

(2-0035-59)

NET CAPITAL COST (Estimated)	\$1,444,574.46
DEDUCT - Payments from Municipalities	<u>670,000.00</u>
Long Term Debt to OWRC	\$ <u>774,574.46</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	\$ <u>107,786.03</u>
Net Operating	\$ 45,317.05
Debt Retirement	15,631.00
Reserve	9,056.26
Interest Charged	43,680.92
TOTAL	\$ <u>113,685.23</u>

RESERVE ACCOUNT

Balance at January 1, 1967	\$ 28,279.01
Deposited by Municipality	9,056.26
Interest Earned	\$ <u>1,525.58</u>
Less Expenditures	<u>(7,228.56)</u>
Balance at December 31, 1967	\$ <u>31,632.29</u>

(2-0076-61)

NET CAPITAL COST (Estimated) Long Term Debt to OWRC	<u>\$160,984.91</u>
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Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	<u>\$ 23,000.47</u>
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Net Operating	\$ -
Debt Retirement	3,249.00
Reserve	790.94
Interest Charged	9,078.50
 TOTAL	 <u>\$ 13,118.44</u>

RESERVE ACCOUNT

Balance at January 1, 1967	\$ 5,687.00
Deposited by Municipality	790.94
Interest Earned	339.92
 Less Expenditures	 -
Balance at December 31, 1967	<u>\$ 6,817.86</u>

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY
JAN	1,770.53	1218.10					175.92		347.24	20.27
FEB	2,334.51	1184.33		242.54	583.05		94.26		200.71	29.67
MARCH	3,416.69	2082.56		213.75	588.29	24.64	101.56		316.80	80.27
APRIL	2,532.44	1275.13		129.50	594.71		255.31	44.38	211.31	22.10
MAY	3,367.70	1397.77		220.02	619.85		210.87	389.56	529.63	
JUNE	2,999.65	1329.57	151.88	132.27	571.59		315.90		326.50	171.94
JULY	6,916.78	1309.34	450.03	152.25	643.77		232.32		323.09	3805.98
AUG	4,318.10	1704.14	432.51	217.17	596.03	933.98	163.46		846.71	22.10
SEPT	3,771.85	1973.89	110.34		595.14		139.01		928.00	25.47
OCT	4,586.99	1323.01		313.50	620.79	954.46	193.41		1086.98	94.84
NOV	5,271.64	1458.72	24.08	114.00	588.01		216.95		58.70	2768.18
DEC	3,422.97	1305.78		199.50	1176.97	(20.48)	196.55	(5.48)	236.94	263.09
TOTAL	45,317.05	17612.36	1168.84	1934.50	7228.20	1892.60	2295.62	428.46	5414.61	7341.86

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$3543.00

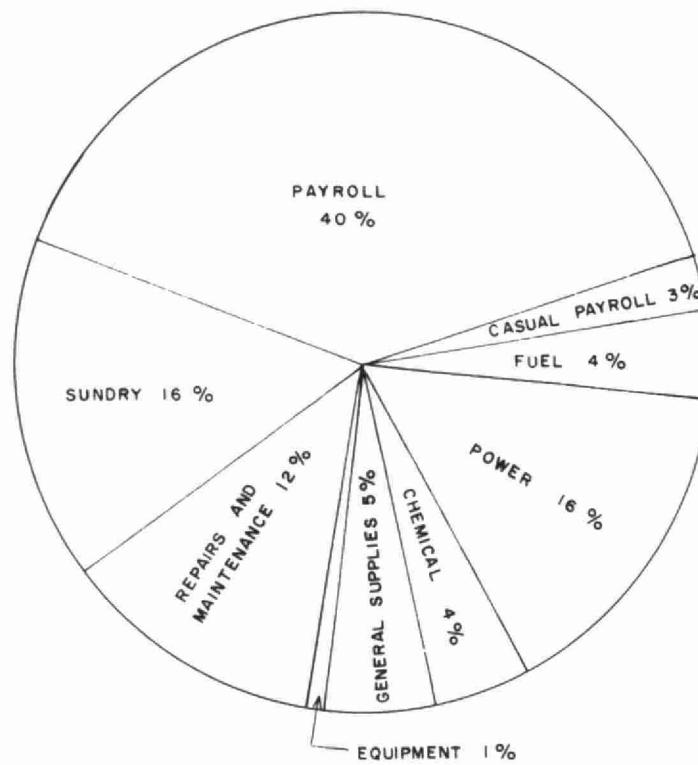
BRACKETS INDICATE CREDIT

YEARLY OPERATING COSTS

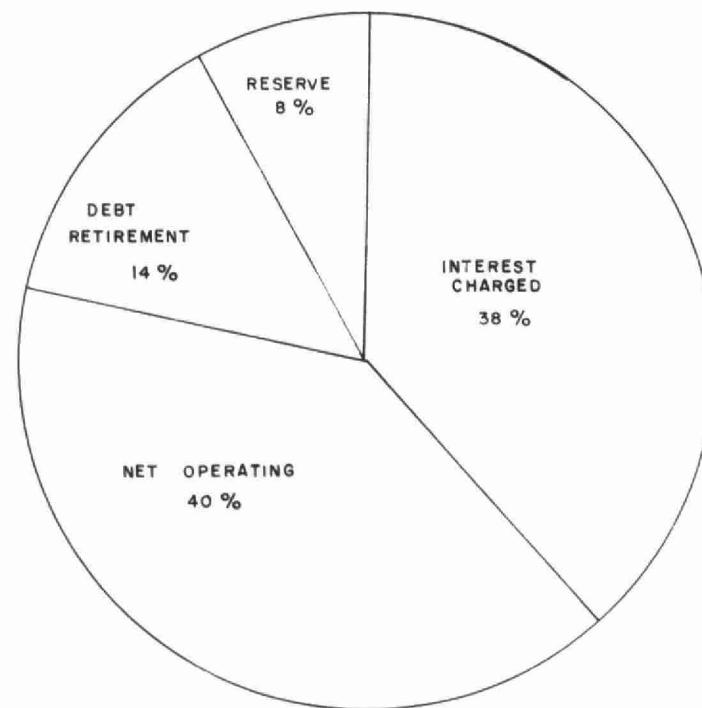
YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1962	660.0*	\$31128.25	\$47.18	7 CENTS
1963	678.8	31925.64	47.08	14 CENTS
1964	726.4	31159.12	42.89	7 CENTS
1965	886.1	32490.61	36.67	9 CENTS
1966	1010.5	33588.90	33.24	16 CENTS
1967	1025.1	45317.05	44.21	20 CENTS

* FRACTIONATED ON SIX MONTHS' DATA

1967 OPERATING COST



TOTAL ANNUAL COST



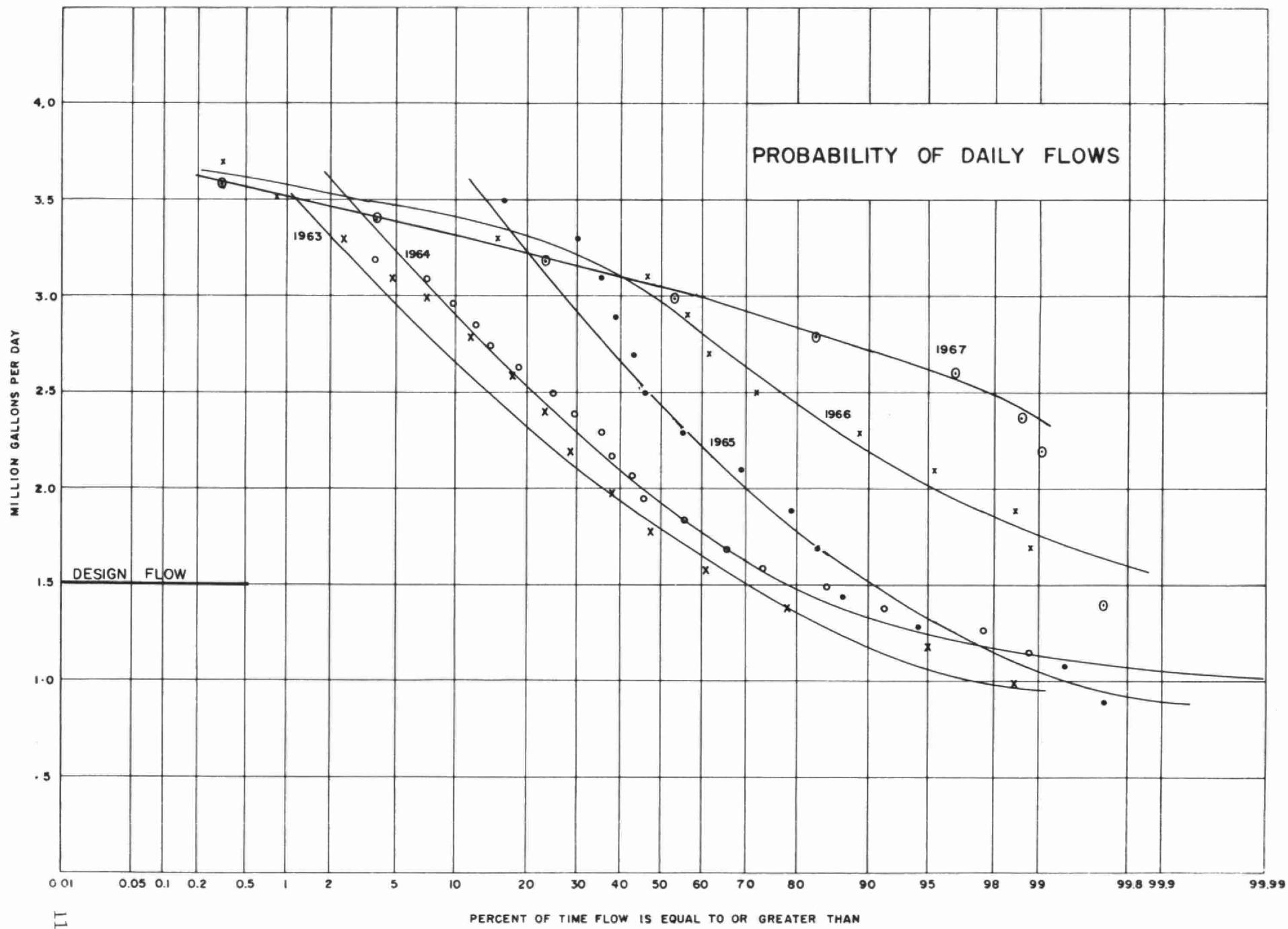
Process Data

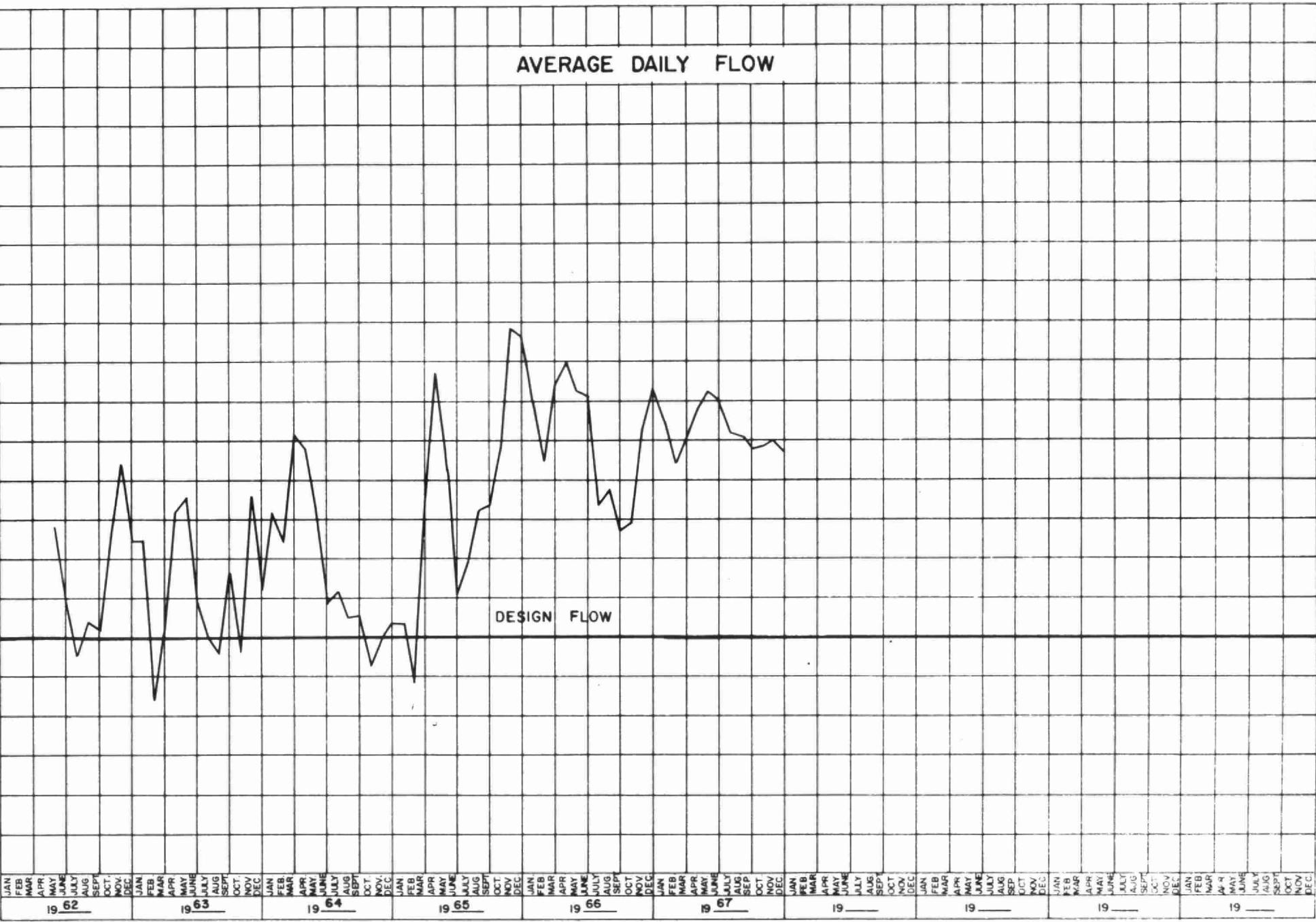
FLows

The 1967 curve on the Probability of Flows reveals a further tendency to receive high flows more frequently. The 1966 and 1967 curves are considerably different in their shape from the previously plotted curves. The 1967 curve indicated that 90% of the time, the flows received at the plant were 2.75 mgd.

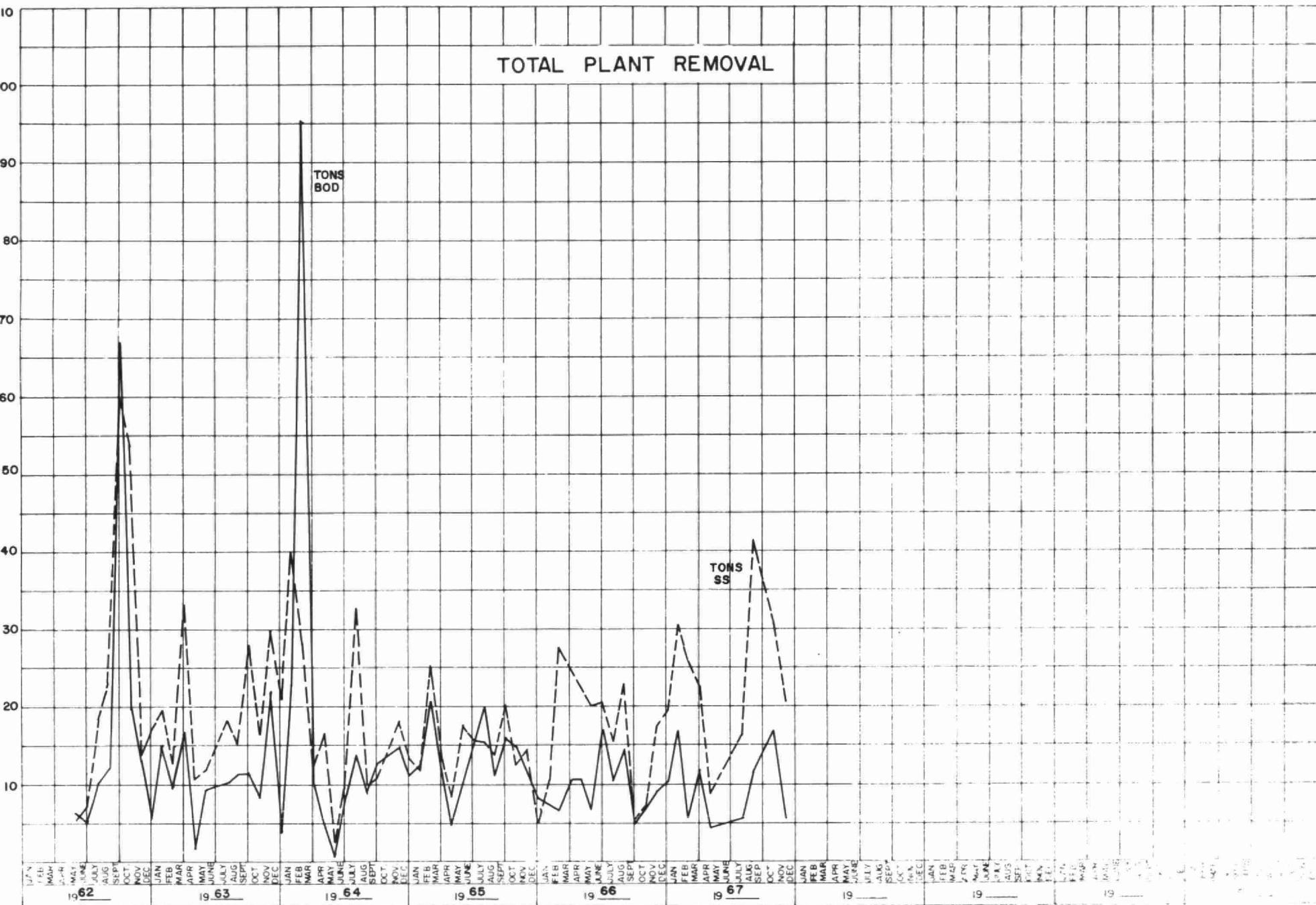
1967 DAILY FLOW GRAPH

The 1967 Daily Flow Graph showed the flows to the plant fluctuated between 2.75 and 3 mgd. This indicated that the flows to the plant were near the capacity of the Shirley's Bay pumping station practically every day of the year in 1967. It should be noted that flows exceeding approximately 3 mgd are automatically by-passed at the pumping station.



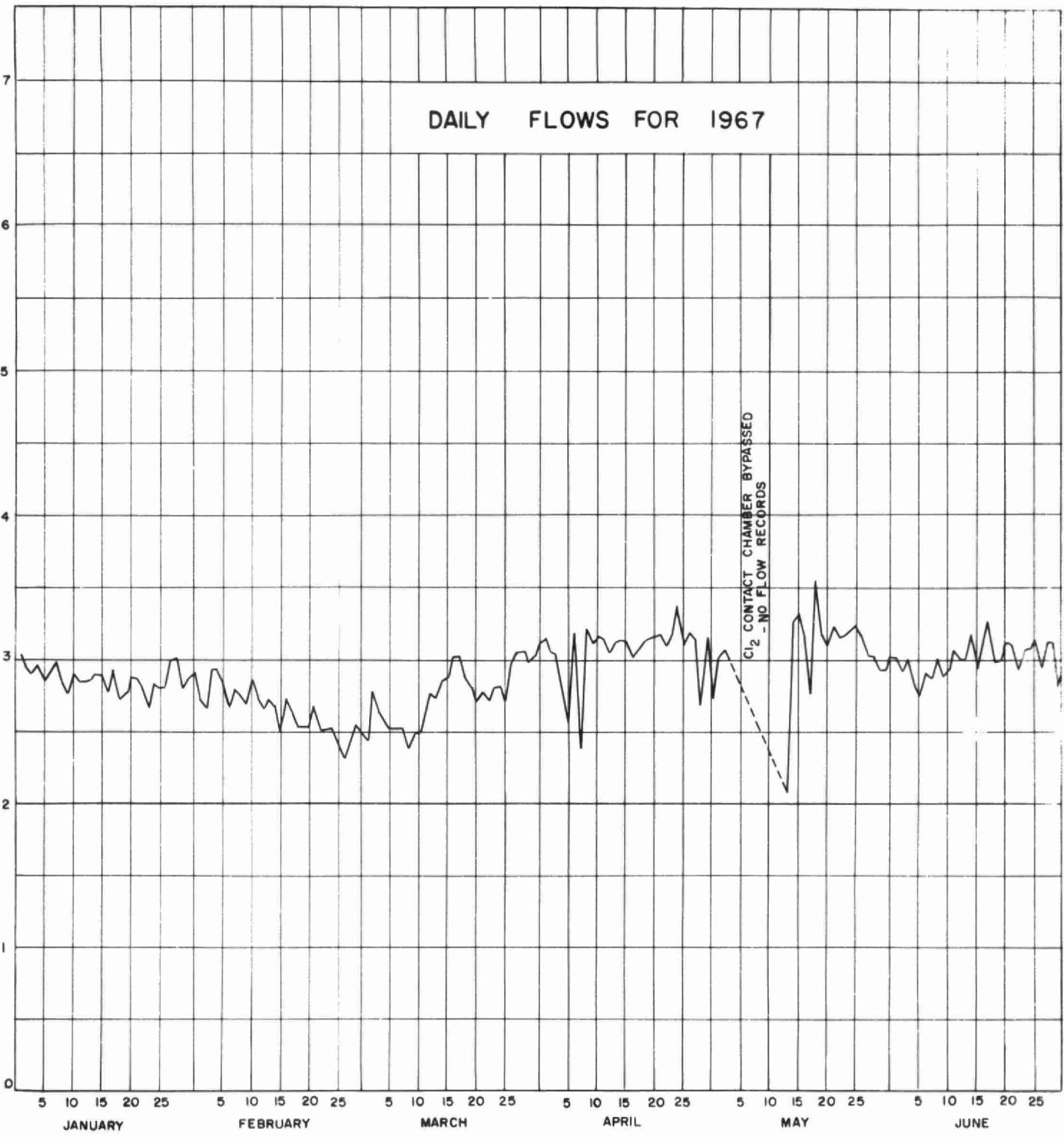


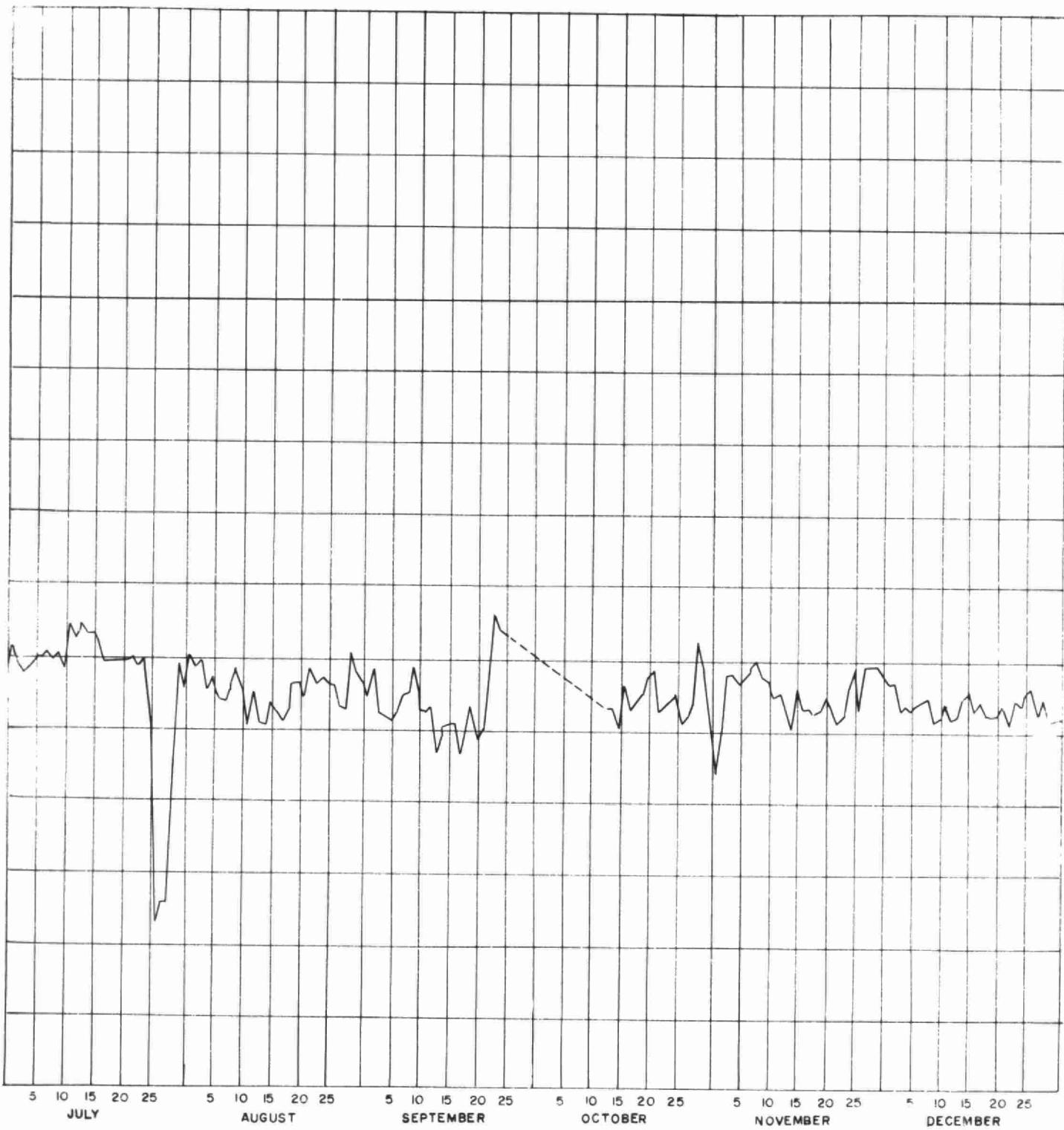
TOTAL PLANT REMOVAL

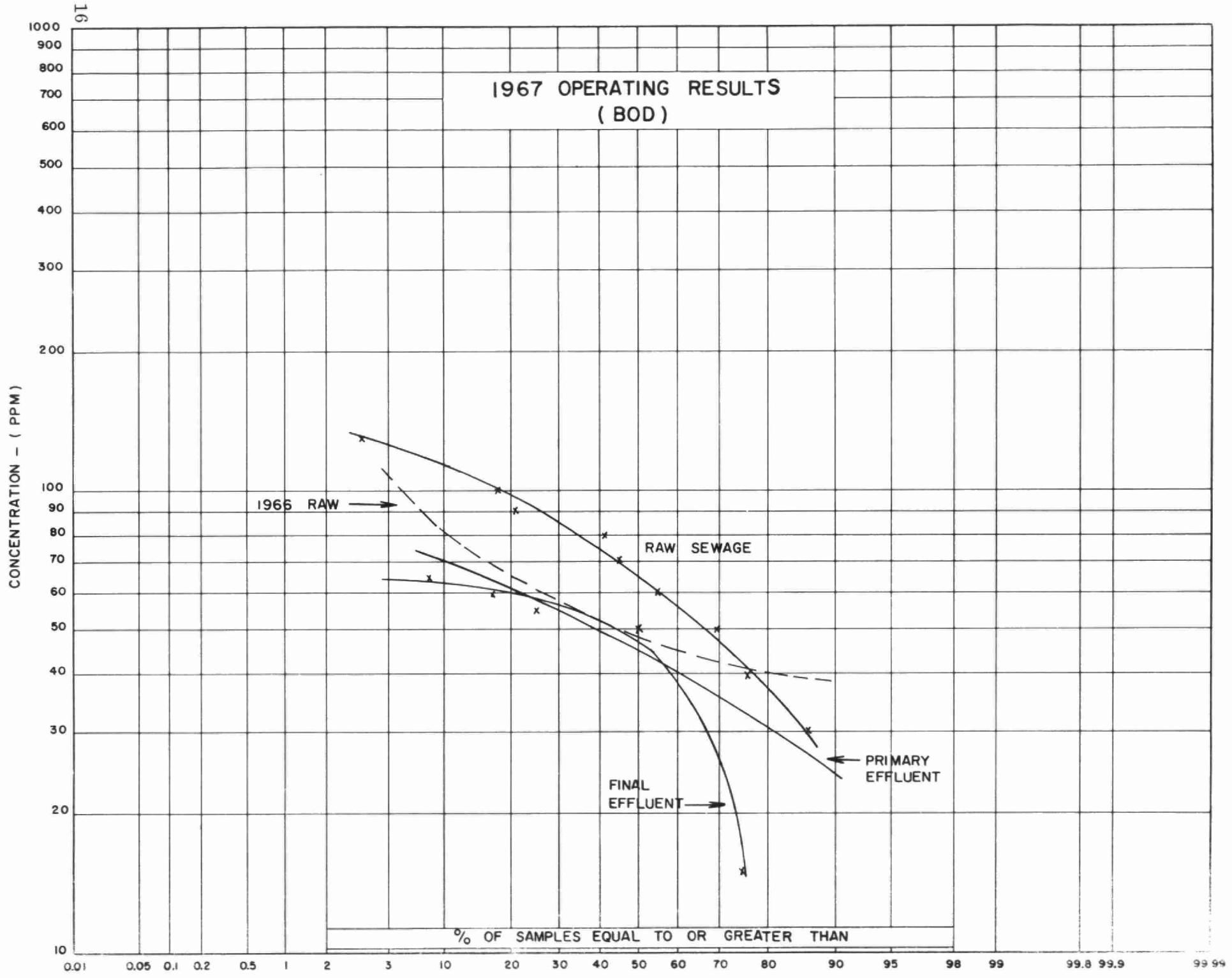


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DAILY FLOW M.G.

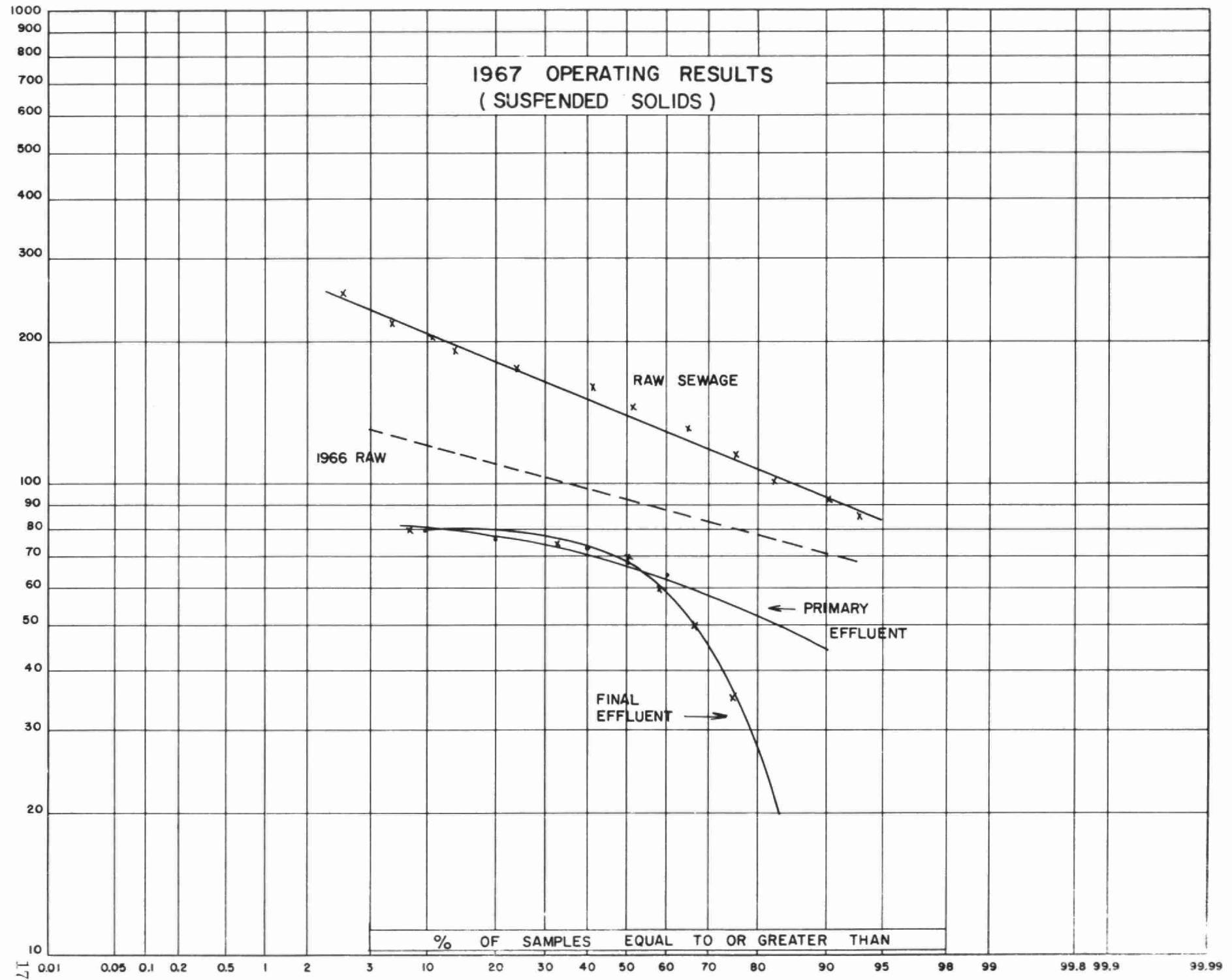


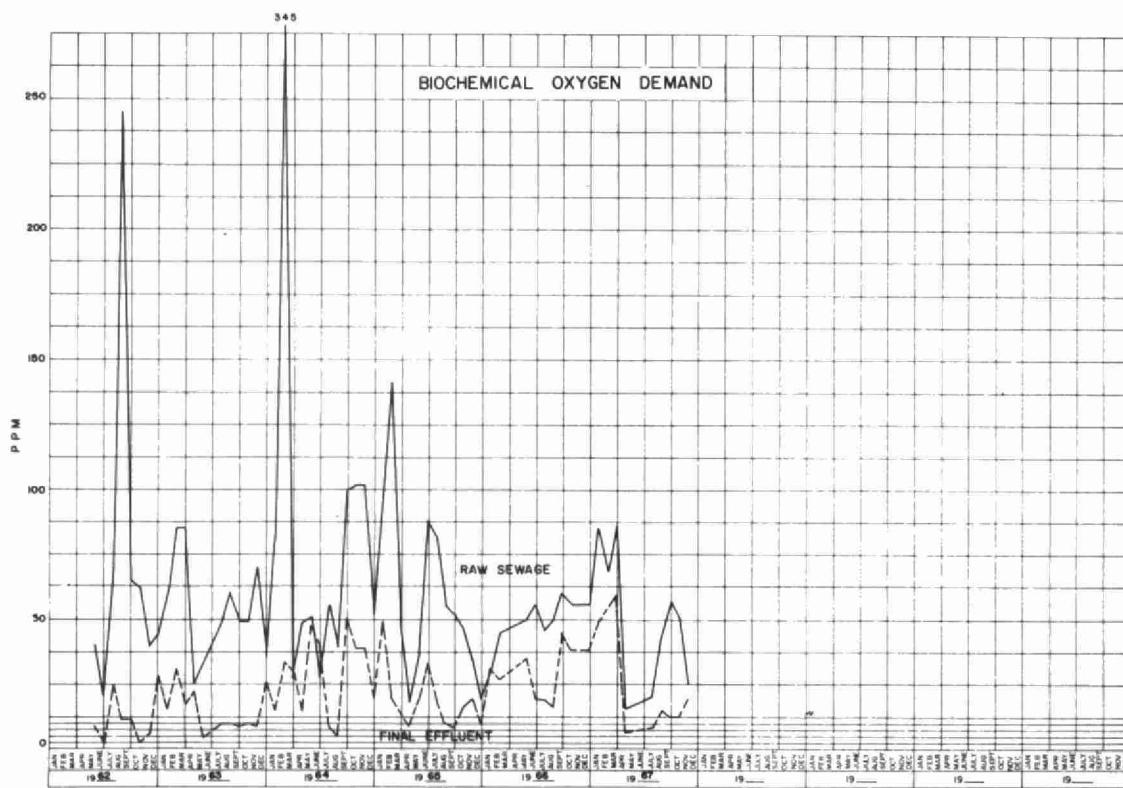




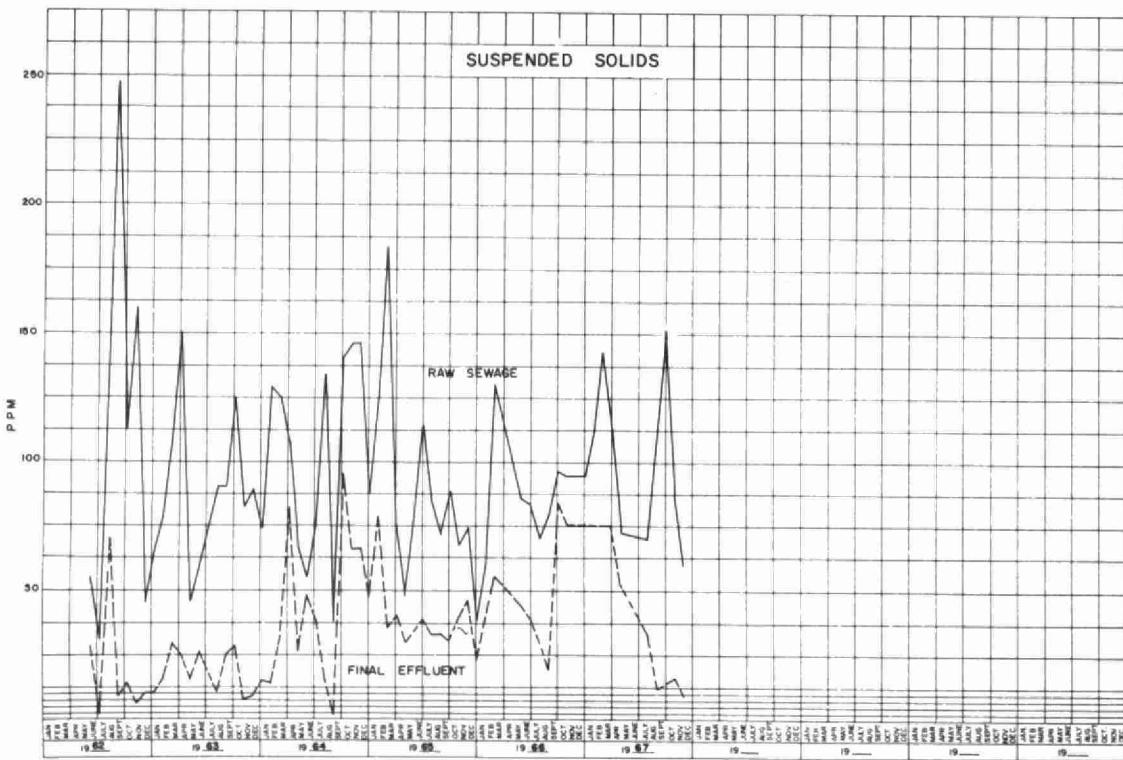
1967 OPERATING RESULTS
(SUSPENDED SOLIDS)

CONCENTRATION - (PPM)





MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU FT
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	85	48	43.5	16.43	141	73	48.2	30.20	-
FEB.	68	53	22.1	5.49	142	73	48.6	25.24	
MAR.	85	59	30.6	11.15	113	73	35.4	17.16	
APR.	16	6.6	58.7	4.16	72	53	26.4	8.41	
MAY	-	-	-	-	-	-	-	-	-
JUNE	-	-	-	-	-	-	-	-	.75
JULY	20	8	60.0	5.21	70	33	52.8	16.06	-
AUG.	42	15	64.3	11.60	108	12	88.9	41.24	-
SEPT.	56	-	-	-	152	-	-	-	-
OCT.	51	12	76.5	16.47	88	16	81.8	30.40	-
NOV.	25	19	52.0	5.34	59	9	84.7	20.54	-
DEC.	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-	112.76	-	-	-	317.79	.75
AVG.	50	28	51.0	9.40	105	43	58.4	26.48	-

COMMENTS

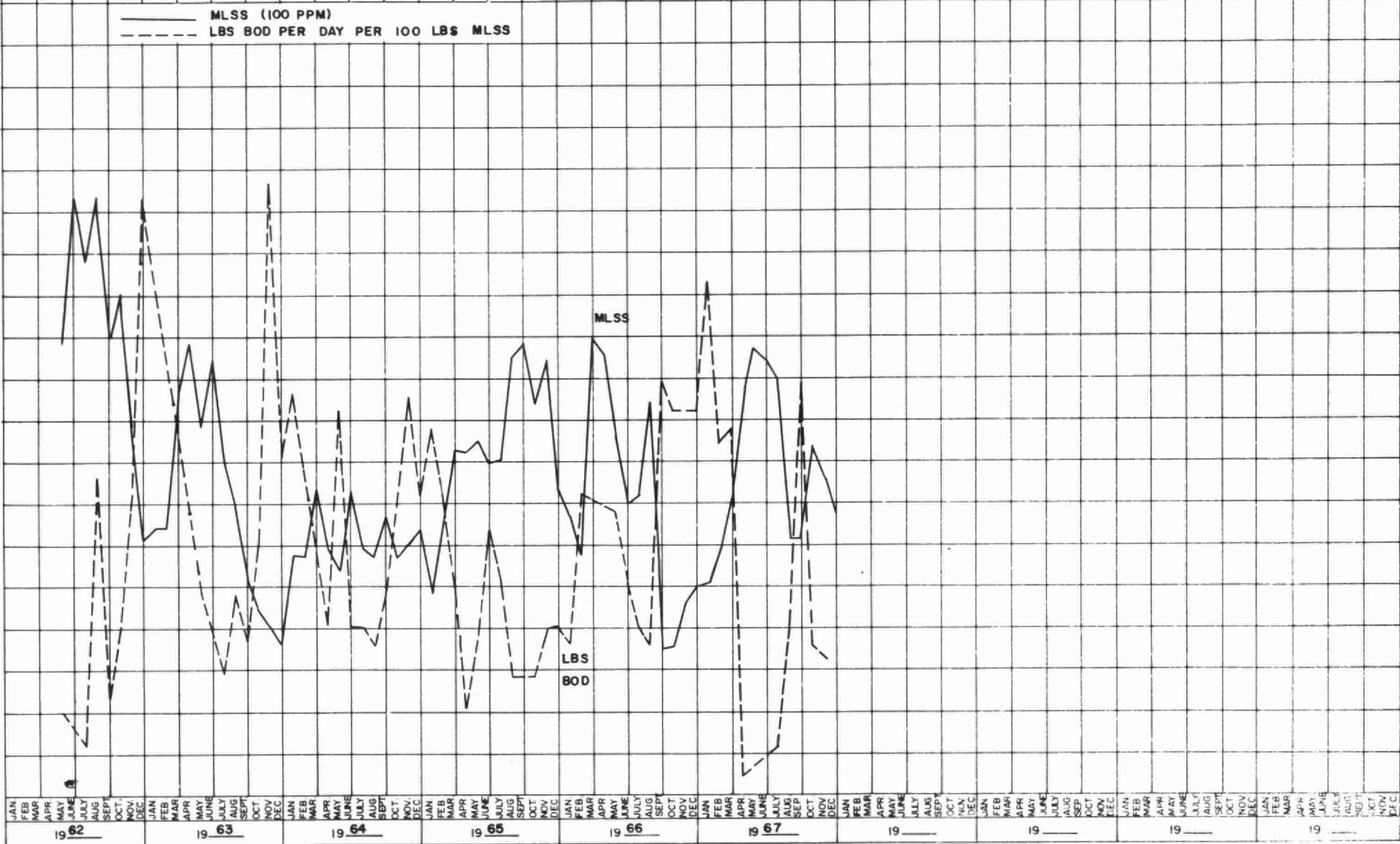
The average strengths of BOD and SS received at the plant in 1967 were 50 and 105 ppm respectively. The percent removal of BOD and SS was 51 and 59 percent respectively. This efficiency is rather low for a secondary treatment plant. However, it should be noted that the hydraulic flows to the plant were nearly twice the capacity of the plant. The results were based on eight-hour composite samples submitted to the OWRC Laboratory for analyses.

The total quantity of BOD removed from the waste in 1967 was 113 tons. The total quantity of SS removed was 318 tons.

Concentration of BOD and SS in the effluent exceeded the OWRC objectives. This is due primarily to the severe hydraulic overloading of the plant.

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AERATION TANK RESULTS



AERATION SECTION

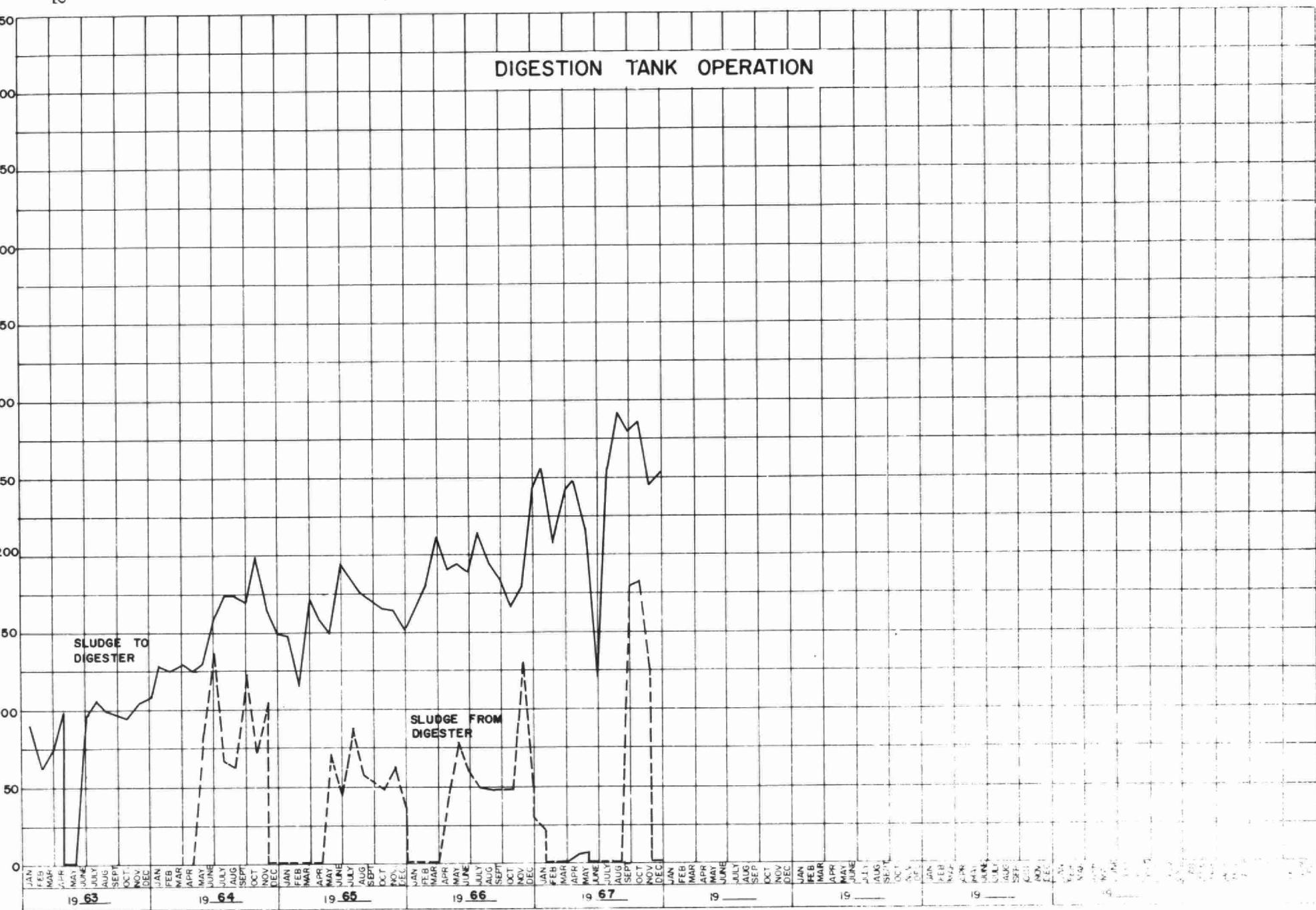
MONTH	PRIM. EFFL B.O.D. PPM.	MLSS. PPM.	LBS. BOD. PER 100 LBS. M.L.S.S.
JANUARY	56	1278	31
FEBRUARY	47	1490	21
MARCH	55	1800	22
APRIL	21	2455	1
MAY	-	2681	-
JUNE	-	2611	-
JULY	10	2490	3
AUGUST	21	1512	10
SEPTEMBER	-	1534	25
OCTOBER	28	2075	9
NOVEMBER	23	1890	8
DECEMBER	-	1668	-
TOTAL	-	-	-
AVERAGE	33	1957	14

COMMENTS

The average loading to the aeration section was 14 pounds of BOD per 100 pounds of mixed liquor. This loading was rather low. It was attributed to the rather diluted waste reaching the plant, and was possibly also due to the present sampling program, which is conducted primarily during daytime hours. It is known, however, that the heavy waste load from the area is received at the plant at approximately 12 noon and extends to approximately 12 midnight.

DIGESTION TANK OPERATION

1000 GALS.



DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu Ft
	GALLONS	% SOLIDS	% VOL MAT	GALLONS	% SOLIDS	% VOL MAT	
JAN	256200			22500			-
FEB	208000			-			991.750
MAR	240800	3.34	75.1	-			1403.840
APR	2464000			2200			764.220
MAY	*213000			2500			721.390
JUNE	**120000			-			-
JULY	253600			-			-
AUG.	291200			-			-
SEPT.	280800			180000			-
OCT.	288000			181500			-
NOV.	240000			120000			-
DEC.	253600			-			-
TOTAL	2891600			208700			3881.200
Avg.	240967	3.34	75.1	84783			-

* Does not include 45,000 gallons raw sludge. Digester down.

** Does not include 189,000 gallons raw sludge. Digester down.

COMMENTS

A total quantity of 2,891,600 gallons of raw sludge was pumped from the primary sedimentation tanks in 1967. A portion of the raw sludge was disposed of by tank truck during the time that the digester was being repaired. The total quantity of digested sludge that was pumped to the sludge drying lagoons was 508,700 gallons.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	88.830	-	-
FEBRUARY	73.169	-	-
MARCH	85.788	-	-
APRIL	88.538	-	-
MAY	95.363	*	2.34
JUNE	90.130	2577	2.86
JULY	86.805	2109	2.42
AUGUST	85.907	** 1654	1.93
SEPTEMBER	81.000	2227	2.74
OCTOBER	84.444	*** 1476	1.75
NOVEMBER	82.175	-	-
DECEMBER	82.981	-	-
TOTAL	1025.130	11197	-
AVERAGE	85.428	1866	2.34

* Chlorination for 16 days

** Chlorination for 30 days

***Chlorination for 18 days

COMMENTS

Chlorination was practised from May 16 to October 14. A dosage of 2.34 ppm of chlorine was required to obtain a chlorine residual of 0.5 ppm after a retention period of 15 minutes. This was done to disinfect the plant effluent.

LABORATORY LIBRARY



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CONCLUSIONS

1. The WPCP was severely overloaded in 1967.
2. The degree of treatment obtained did not meet OWRC objectives. The low efficiency was caused by the overloaded condition of the plant.

